CEBAF EXPERIMENT 91-007

Measurement of the Nuclear Dependence and Momentum Transfer Depencence of Quasielastic *(e,e'p)* Scattering at Large Momentum Transfer

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Of great current interest in nuclear and particle physics is the conjecture of Mueller and Brodsky called **color transparency:** this postulates that scattered high momentum nucleons traversing the nuclear medium will have diminished final state interactions. By measuring the quasielastic *(e,e'p)* cross-section as a function of the nuclear size and the momentum transfer of the struck proton, this idea can be tested directly. This is the basis of the CEBAF experiment E91-007 which will run in Hall C. While the original work of Mueller and Brodsky was based on considerations of Perturbative Quantum Chromodynamics (PQCD), recent authors have concluded that the phenomenon of color transparency may not require the high momentum transfers necessary for PQCD to be applicable. Experimental discovery of color transparency would be very exciting as it would provide a completely new way to study QCD in nuclei. Conversely, a negative result would constrain our understanding of the approach to PQCD in exclusive processes.

E91-007 will take advantage of the precise energy resolution, high duty factor, and high beam current of the CEBAF accelerator and the relatively large solid angles of the magnetic spectrometers to make measurements of the quasielastic *(e,e'p)* cross-section to the highest available momentum transfer. In particular, at CEBAF for the first time, it will be possible to study the dependence of the final-state interaction at high momentum transfers on the initial state of the nucleon. It is predicted that nucleons more tightly bound in the nucleus would have more sensitivity to color transparency effects than nucleons at the surface of the nucleus. Electrons will be detected in the Short Orbit Spectrometer and coincident protons in the High Momentum Spectrometer from hydrogen, carbon, iron, and gold nuclear targets. The highest attainable momentum transfer will be determined by the maximum available incident beam energy.

Recently, the NE-18 collaboration completed pioneering measurements of quasielastic *(e,e'p)* scattering from hydrogen, deuterium, carbon, iron, and gold targets with a maximum incident beam energy of 5.1 GeV at momentum transfers of Q^2=1, 3, 5, and 7 $(\mathrm{GeV/c})^2$ at the Stanford Linear Accelerator Center. The data are at present being analyzed and first results are anticipated in early 1993. NE-18 can be viewed as a first generation experiment which will be superseded in statistical and missing energy precision by the CEBAF experiment E91-007.